Challenges and Opportunities in Diesel Emission Characterization and Exhaust Aftertreatment Research

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This seminar will describe Cummins recent research activities in the areas of diesel emission characterization and exhaust aftertreatment technology. The seminar will review the world-wide regulations on diesel PM and NOx emissions and overview the general approaches to meeting these standards, including the application of aftertreatment technologies such as diesel particulate filter (DPF) and selective catalytic reduction (SCR) systems. The seminar will then discuss the new developments on methodology and instrumentation to characterize diesel PM size distributions and number concentrations, measure the fractional efficiency of DPFs, and determine the ultra-trace levels of many unregulated species emissions, especially EC/OC, ions/metals/inorganic compounds, and $C^1 - C^{35}$ organic species. The seminar will compare measurement strategies using gravimetric, chemically reconstructed, and size integrated methods for ultra-low diesel PM mass emissions. The seminar will share Cummins experience on mobile source emission speciation under steady-state and transient conditions.

About the Speaker:
Jerry Liu is currently the Director of Research & Development with Cummins Emission Solutions. His recent research areas include aerosol dynamics, source sampling and emission speciation, nano/ultrafine PM characterization and control, filtration and separation, and aftertreatment technology. Dr. Liu has published over 60 technical papers on these topics and holds over 20 patents dealing with engine emission control, filtration, and HVAC. Dr. Liu received his Ph.D. degree in Environmental Engineering from the University of Wisconsin-Madison and is a registered Professional Engineer in the State of Wisconsin. In 2008, he received the Excellence in Review Award from American Chemical Society and the Dr. Frank Tiller Award from American Filtration & Separation Society for his outstanding achievements in engineering and education. Dr. Liu is a member of the Board of Directors for AFS and a member of SAE, ASME, and the American Association for Aerosol Research.